

Five-Year Review Report  
A.O. Polymer Superfund Site  
Sparta Township  
Sussex County, New Jersey

Prepared by:



United States Environmental Protection Agency  
Region 2  
New York, New York

April 2008

## Five-Year Review Summary Form

SITE IDENTIFICATION		
Site Name ( <i>from WasteLAN</i> ): A.O. Polymer		
EPA ID ( <i>from WasteLAN</i> ): NJD030253355		
Region: 2	State: NJ	City/County: Sussex
SITE STATUS		
NPL Status: <input checked="" type="checkbox"/> Final <input type="checkbox"/> Deleted <input type="checkbox"/> Other (specify)		
Remediation Status (choose all that apply): <input type="checkbox"/> Under Construction <input checked="" type="checkbox"/> Constructed <input checked="" type="checkbox"/> Operating		
Multiple OUs? Yes	Construction completion date: 5/08/98	
Are portions of the site and/or investigated adjacent properties in use or suitable for reuse? Yes, adjoining commercial and residential as well as a park have been investigated and are currently in use. In addition, a portion of the site has been deleted from the NPL and plans are underway for its reuse.		
REVIEW STATUS		
Lead agency: <input checked="" type="checkbox"/> EPA <input type="checkbox"/> State <input type="checkbox"/> Tribe <input type="checkbox"/> Other Federal Agency		
Author name: Rich Puvogel		
Author title: Remedial Project Manager	Author affiliation: EPA	
Review period: 09/30/2003 - 09/30/2008		
Date(s) of site inspection: 02/28/08		
Type of review: <input checked="" type="checkbox"/> Post-SARA <input type="checkbox"/> Pre-SARA <input type="checkbox"/> NPL-Removal only <div style="margin-left: 40px;"> <input type="checkbox"/> Non-NPL Remedial Action Site <input type="checkbox"/> NPL State/Tribe-lead  <input type="checkbox"/> Regional Discretion <input type="checkbox"/> Statutory <input checked="" type="checkbox"/> Policy </div>		
Review number: <input type="checkbox"/> 1 (first) <input checked="" type="checkbox"/> 2 (second) <input type="checkbox"/> 3 (third) <input type="checkbox"/> Other (specify)		
Triggering action: <input type="checkbox"/> Actual RA Onsite Construction at OU # 1 <input type="checkbox"/> Actual RA Start at OU# <u>  1  </u> <input checked="" type="checkbox"/> Construction Completion <input type="checkbox"/> Previous Five-Year Review Report <input type="checkbox"/> Other (specify)		
Triggering action date ( <i>from WasteLAN</i> ): 9/30/1998		
Due date ( <i>five years after triggering action date</i> ): 09/30/2008		
Does the report include recommendation(s) and follow-up action(s)? <input type="checkbox"/> yes <input checked="" type="checkbox"/> no		

## **Five-Year Review Summary Form (continued)**

### ***Issues, Recommendations, and Follow-Up Actions***

This site has ongoing soil and groundwater remediation activities consistent with the decision documents. This report did not identify any issue or make any recommendation for the protection of public health and/or the environment which was not included or anticipated by the site decision documents.

### ***Protectiveness Statement***

The remedy at OU1 is protective of human health and the environment because the soil vapor extraction system is currently operating and effectively removing volatile organic compounds from the soil. The remedy at OU2 is protective of human health and the environment because the groundwater pump and treatment system is operating, and there are no drinking water wells within the contaminant plume and none are expected. The groundwater contaminant plume is confined to the shallow aquifer and confined within the immediate vicinity of the site. The groundwater contaminants that are removed via the extraction/treatment facility are captured by a resin bed system and are drummed for removal from the site. Currently, there is no exposure of human and/or environmental receptors to site contaminants. Because the remedial actions at all operable units are protective, the site is protective of human health and the environment.

## Table of Contents

EXECUTIVE SUMMARY .....	1
INTRODUCTION .....	1
SITE CHRONOLOGY .....	2
BACKGROUND .....	2
SITE LOCATION .....	2
PHYSICAL CHARACTERISTICS .....	2
SITE GEOLOGY/HYDROGEOLOGY .....	3
LAND AND RESOURCE USE .....	4
HISTORY OF CONTAMINATION .....	5
REMEDIAL ACTIONS .....	7
REMOVAL ACTIONS .....	7
REMEDY SELECTION .....	8
REMEDY IMPLEMENTATION .....	9
FIVE-YEAR REVIEW PROCESS .....	12
COMMUNITY INVOLVEMENT .....	12
DOCUMENT REVIEW .....	12
DATA REVIEW .....	12
SITE INSPECTION .....	13
INTERVIEWS / MEETINGS .....	13
INSTITUTIONAL CONTROLS VERIFICATION .....	13
TECHNICAL ASSESSMENT .....	14
RECOMMENDATIONS AND FOLLOW-UP .....	17
PROTECTIVENESS STATEMENT .....	18
NEXT REVIEW .....	18
TABLE 1: CHRONOLOGY OF EVENTS .....	19
TABLE 2: DOCUMENTS, DATA, AND INFORMATION REVIEWED IN COMPLETING THE FIVE YEAR REVIEW .....	20
TABLE 3: SVE SYSTEM MONTHLY MONITORING REPORT .....	21
TABLE 4: COMPARISON OF GROUNDWATER STANDARDS FOR CHEMICALS OF CONCERN: PRE TREATMENT AND POST TREATMENT CONCENTRATIONS .....	22
TABLE 5: ACRONYMS USED IN THIS DOCUMENT .....	23
FIGURE 1: PRE REMEDIATION TCE ISOCONCENTRATION CONTOUR MAP .....	24
FIGURE 2: REMEDIATION TCE ISOCONCENTRATION CONTOUR MAP .....	25

## **Executive Summary**

This is the second five-year review for the A.O. Polymer Superfund Site. This site is located in Sparta Township, Sussex County, New Jersey. Currently, the implemented remedial actions are functioning as intended and are protective of human health and the environment.

### **I. Introduction**

This is the second five-year review for the A.O. Polymer Superfund site (Site), located in Sparta Township, Sussex County, New Jersey. This review was conducted by U.S. Environmental Protection Agency (EPA) Remedial Project Manager (RPM), Rich Puvogel. This review was conducted in accordance with the Comprehensive Five-Year Review Guidance, OSWER Directive 9355.7-03B-P (June 2001). The purpose of five-year reviews is to assure that implemented remedies protect public health and the environment and that they function as intended by the decision documents. This report will become part of the site file.

The evaluation described herein assesses the protectiveness of the selected remedy for the A.O. Polymer site. The June 23, 1991 Record of Decision (ROD) called for two distinct technologies to address the Site's contamination, one which addresses subsurface soil contamination above the groundwater table in the former waste lagoon area referred to as the Disposal Area, and the other addresses the groundwater contamination. The soil contamination is the source of the groundwater volatile organic compound (VOC) contaminant plume and the soil contamination is addressed under a source control alternative, while the groundwater contamination is addressed under a management of migration alternative. EPA issued one ROD for the two media.

For the purpose of remediation, the Site has been divided into two portions, the Disposal Area and the Facility Area. The 3.76 acre Facility Area contains buildings and equipment used for resin production and solvent recycling. The 0.42 acre Disposal Area is the former location of unlined chemical waste pits. EPA and the State of New Jersey Department of Environmental Protection (NJDEP) addressed surficial contamination, such as soil, drums, and other miscellaneous items, on the Facility Area through a series of removal actions. The Facility Area was deleted from the National Priorities List (NPL) on August 26, 2000. The remedial response actions described in the 1991 ROD

address all known soil and groundwater contamination at the Disposal Area of the site and are the final remedial actions contemplated for the Site.

The remedial action objective for the site, including the Disposal Area and the groundwater, is unlimited use without restriction. This objective has already been attained for the Facility Area, however this objective may take many years to achieve for the Disposal Area and groundwater. Until that objective is reached, five-year reviews will be required.

## **II. Site Chronology**

Table 1 (attached) summarizes the site-related events from discovery to the present.

## **III. Background**

### *Site Location*

The Site is an inactive facility located at 44 Station Road in the Township of Sparta, Sussex County, New Jersey. The property occupies 4.18 acres near the Sparta Rail Road Station along the New York, Susquehanna and Western (NYS&W) Railway property boundary. The property is bounded to the north and east by Station Park, a municipal recreation area, to the southeast by Station Road, and to the south and west by the NYS&W Railway. The original facility was located on two lots delineated by a Sussex County tax map as Block 19, Lot 45-B (3.22 acres) and Lot 45-C (0.96 acres).

### *Physical Characteristics*

As previously mentioned, EPA divided the Site into two separate portions, the Facility Area and the Disposal Area. Structures at the 3.76 acre Facility Area portion included office and laboratory facilities, a main reactor building, assorted storage buildings, and a non-contact cooling water pond. The office, reactor building, and laboratory were used by A.O. Polymer in its manufacturing processes. The cooling water pond, which is located in the southeast quadrant, has no surface outlet, and is lined with concrete. It was used for the recirculation of non-contact cooling water and was periodically replenished with water from an on-site production well. The 0.42-acre Disposal Area contained the disposal pits.

In accordance with 40 CFR 300.425(e) and the Notice of Policy Change: Partial Deletion of Sites Listed on the National Priorities List 60 Federal Register 55466 (Nov. 1, 1995), EPA deleted the Facility Area portion of the Site from the NPL on August 26, 2000, and this area is available for unrestricted use. Hence, only the Disposal Area portion of the Site and groundwater plume remain on the NPL and are subject to evaluation in this Five Year Review.

#### *Site Geology/Hydrogeology*

The region surrounding Sparta, New Jersey is underlain by many rock types. Pre-Cambrian rocks form the hills to the west and Sparta Mountains to the east of the town. The Wallkill River valley is underlain by a combination of Cambrian Hardystone and Cambro-Ordovician Kittatinny Limestone of which the Allentown Formation is of most importance. The Allentown Formation is a thick, rhythmically bedded, impure dolomite that locally contains significant amounts of groundwater.

Sussex County is located in the New Jersey Highland Physiographic Province. This area is characterized by linear valleys and ridges, predominantly trending northeast and southwest. This linearity is the result of two major tectonic upheavals which severely deformed the entire region. As a result, bedrock is highly deformed by both folding and faulting.

The Site is situated atop a small hill in the center of the valley, possibly a remnant of a stratified drift deposited by glacial meltwater. Glacial deposits consisting of silts, sands, gravel and boulders comprise the overburden. The overburden aquifer extends down to the top of the bedrock at the site which has been encountered at a depth ranging from 17 to 123 feet below ground surface. In addition to being highly fractured and weathered, the bedrock also has locally significant solution cavities. This bedrock, the Allentown Formation, is a source of potable water in the Wallkill valley.

The water table beneath the property is approximately 17 feet below grade. Depth to the water table decreases to the north and east of the property, until it is less than three feet below the surface in Station Park next to the Wallkill River. Remedial Investigation (RI) data show that both the water table and bedrock aquifers are hydraulically interconnected and that groundwater contamination from the site has moved downward through the glacial overburden, and migrated from the site through the shallow portions of the Allentown formation.

The 1990 RI data defined the latitudinal (east - west) and longitudinal (north - south) extent of the groundwater contaminant plume. The northernmost boundary of the plume at the time of the RI was 400 feet north of the site, and the southernmost boundary of the plume did not extend past the southern boundary of the site. At the time of the RI it was noted that, laterally, the plume had stabilized. The plume originates from the Disposal Area and extends to the Wallkill River in an east/northeasterly direction (see figure 1). The plume is confined to relatively shallow portions of the groundwater flow system and is discharged to the river along with the normal groundwater flow. The down-gradient extent of the plume from the Disposal Area is limited by the Wallkill River. Transport past the river is not indicated by the RI or subsequent data and appears to be unlikely given present hydrologic conditions. The Wallkill River is a groundwater discharge area, a fact that is corroborated by the apparent convergence of piezometric contours at the river and the upward gradients observed along both sides of the river. Furthermore, contamination in the deep wells on the east side of the river (opposite the site) has not been detected, suggesting that the plume is confined to relatively shallow portions of the flow system and is thus discharged to the river along with the groundwater.

#### *Land and Resource Use*

The 3.76 acre Facility Area is now available for unrestricted reuse. EPA has filed an *in rem* action against the property to recover past costs. In 2005, EPA obtained a default judgment against A.O. Corporation and the property comprising the Site. Subsequently, EPA and other interested parties having claim to the property reached an agreement that has been incorporated in the terms of a Consent Decree. Pursuant to the Consent Decree, the Site will be sold and the interested parties will divide the proceeds of the sale. It is expected that the United States Marshals Service will conduct the sale of the Site in 2008.

The 0.42 acre Disposal Area, which remains on the NPL, will be included in the sale of the Site. The groundwater plume extends beneath Station Park, which is not adversely affected by the groundwater contamination.



## *History of Contamination*

From the early 1960s until 1994, the Site was the location of two businesses: Mohawk Industries (Mohawk), which operated a resin manufacturing and solvent reclamation business; and later A.O. Polymer Corporation (A.O. Polymer), which continued the resins manufacturing processes of Mohawk. In 1978, the facility was purchased by A.O. Corporation, the parent corporation of A.O. Polymer. A.O. Polymer purchased the rights to manufacture resin products previously produced by Mohawk. A.O. Polymer continued to utilize the same processing machinery, storage vessels, and laboratories used by Mohawk. For approximately one year in 1978, A.O. Polymer also continued Mohawk's solvent reclamation process. The activities of these companies contaminated the soil and groundwater at the Site.

Complaints of odors emanating from well water and air near the Site were first registered by citizens living or working near the Site in 1973. Complaints of odors and bad smelling well water intensified in 1978, touching off formal investigations by the Sparta Health Department and the NJDEP.

In 1978, NJDEP began investigating reports of drum stockpiling at the Site. These investigations identified on-site waste disposal and storage practices as the source of groundwater contamination in residential wells. Waste handling practices included disposal of liquid chemical waste into unlined disposal pits, improper storage of over 800 deteriorating drums, and burial of crushed and open drums containing waste materials including volatile and semi-volatile organic compounds.

In December 1978, NJDEP inspectors and Sparta Health Department officials collected samples from potable wells surrounding the Site. Analysis of these samples revealed the existence of VOCs in three domestic wells located along Station Road. In June 1979, the owners of the three affected wells filed damage claims with the New Jersey Hazardous Spill Fund, and in January 1980, these homes were connected to a municipal water supply.

In 1980 and 1981, surficial cleanup at the Site was initiated by NJDEP, including the removal of surface drums and the excavation and removal of contaminated soil located in the unlined waste pit area (i.e., the Disposal Area). The Disposal Area of the Site was reportedly excavated to a depth of approximately 10 feet and backfilled with clean soil. This cleanup resulted in the removal of 1,150 drums; 1,700 cubic yards of contaminated soil; and 120 cubic yards of crushed drums and debris.

On September 1, 1983, the Site was placed on the NPL

In 1984, a Remedial Investigation and Feasibility Study (RI/FS) was performed by NJDEP and funded by EPA through a Cooperative Agreement with NJDEP. During the RI, the Disposal Area was sampled. Soil samples taken from this area of the Site and compared with other soil samples taken from other portions of the Site indicated that the soil beneath the Disposal Area contained residual VOC contamination. Subsurface soil analysis indicated that organic chemicals seeped from the disposal pits into the unsaturated soil zone, also known as the vadose zone, and had become lodged within the pore spaces of the soil. The organic compounds retained in the soil pores are relatively mobile. These compounds desorb upon contact with infiltrated groundwater providing a relatively constant release of contamination to groundwater. As a result, the contaminated vadose zone soils are likely to constitute a prolonged and significant source of groundwater contamination. The source area is located approximately 10 feet below the ground surface down to the water table at a depth of 25 feet. This contaminated soil area takes up approximately 0.42 acre of the A.O. Polymer property and is bounded to the northwest and southwest by the Gun Club access road and to the northeast and southeast by a steep embankment that adjoins the park property. The estimated volume of contaminated soil beneath the disposal pits at the time of the RI was approximately 7,500 cubic yards.

Concern regarding the extent of groundwater contamination resulted in additional investigations by NJDEP. NJDEP's Division of Water Resources installed 11 monitoring wells on and adjacent to the Site to determine the extent of groundwater contamination. Sampling confirmed that contamination had reached the Allentown formation, which is a source of potable water in the area. Sampling also indicated that groundwater contamination had migrated to Station Park, 300 yards northeast of the Site.

After initial indications of groundwater contamination were confirmed, NJDEP installed a network of 18 additional monitoring wells during the RI/FS. These 18 monitoring wells were installed in and around the Site to characterize the nature and extent of groundwater contamination. The RI report confirmed that the source of groundwater contamination was located in the subsurface soil of the Disposal Area and the groundwater contamination threatened a drinking water aquifer.

At the time of the RI, the area of groundwater contamination was approximately 1,000 feet long and 900 feet wide and extended from the A.O. Polymer Disposal Area to the Wallkill River. The majority of the groundwater contamination was located beneath Station Park.

Groundwater contamination in the water table aquifer consisted primarily of VOCs including carbon tetrachloride, chlorobenzene, methylene chloride, 1,1,1-trichloroethane. The compounds were detected at levels above the Federal and New Jersey Maximum Contaminant Levels (MCLs) for these compounds.

At the time of the RI, the groundwater contaminant plume was discharging to the wetland area located on the west side of the river as well as the river itself, as evidenced by detections of 1,1-dichloroethene (1,1-DCE) and 1,2-dichloroethene (1,2-DCE) in surface water samples from the wetland and river. Eight surface water samples were taken during the RI from four points in the river and wetland. Samples taken upstream from the contaminant discharge plume were consistent with background levels. VOCs entering the Wallkill River from the contaminated groundwater are quickly attenuated by dilution, volatilization and degradation, as reflected by the low levels that were detected in the down-stream samples.

The wetland area is located 1,600 feet northeast of the site and extends along the side of the river approximately 1,200 feet. Surface water samples from the wetland area have higher contaminant concentrations than the surface water samples collected from the Wallkill River. Concentrations of VOCs, including 1,2-DCE, dichloroethane, vinyl chloride, and trichloroethene were detected in surface water samples collected from the wetland. Levels of VOCs detected in the surface water samples of the Wallkill River and the wetland were not significant.

#### **IV. Remedial Actions**

##### *Removal Actions*

In early 1994, production activities at the facility ceased and the Site operator abandoned the site leaving hazardous material improperly stored and unsecured on the Facility Area of the Site. In response to requests from the Township of Sparta Health Department, EPA initiated a removal action at the abandoned facility on April 27, 1994. Additional soil samples and waste samples were collected at the Facility Area during the

removal action. Sample results indicated that hazardous substances contained in drums and tanks found at the Site were being released to the environment. EPA removal activities included removal of hazardous materials from the laboratory building, storage building, reactor building, some above-ground piping and tanks, as well as an underground storage tank.

During EPA's removal activities, 121 cubic yards of soil, 91 cubic yards of asbestos-containing materials, 34,000 pounds of hazardous waste, 37,600 pounds of non-hazardous waste, and 3,491 gallons of bulked hazardous liquids were removed from the Site.

After removal activities were completed, EPA collected confirmatory soil samples to determine if any remaining areas of the Site were in need of remediation. An analysis of earlier RI/FS soil samples and the post-removal action soil samples taken on the Facility Area indicated that soil on the Facility Area does not exceed New Jersey Residential Direct Contact Soil Cleanup Criteria.

In 2006, four partially buried drums were discovered in a densely vegetated area in the eastern portion of the site by a potentially responsible party (PRP) who, as discussed below, has been performing remedial activities at the site. With EPA oversight, the PRP sampled the drum contents, removed the drums, performed geophysical testing in the area, and sampled soil. Elevated Total Petroleum Hydrocarbons (TPH) were detected in one drum; TPHs were not detected in post excavation samples. A light colored powder was found in this area and was sampled by the PRP and EPA. Although the powder could not be identified, further testing indicated it was non-hazardous and the material was left in place. No further action is planned for this area.

#### *Remedy Selection*

Based on the results of the RI/FS, EPA issued a ROD on June 28, 1991, which selected two distinct technologies to address the contamination at the Site. The selected remedy called for a soil vapor extraction (SVE) system to remove VOC contamination from soil in the Disposal Area and a groundwater extraction and treatment system to address the contaminated groundwater through a system of extraction wells and a treatment utilizing a powdered activated carbon filtration system. The ROD called for treated water to be re-injected to the groundwater.

## *Remedy Implementation*

After the ROD was signed, EPA became the lead agency in charge of response activities at the Site. EPA identified Potentially Responsible Parties (PRPs) and issued a Unilateral Administrative Order to conduct the Remedial Design and Remedial Action (RD/RA). Design of the SVE system started on April 2, 1992 and was completed on May 11, 1994. By October 1994, construction of the SVE system was completed and the system was operational and functional in January of 1995. Both the SVE and groundwater extraction waste streams ran through separate treatment plants located on property adjacent to the A.O. Polymer property designated in the county tax records as Lot 45-A. In August of 2001, the PRP diverted the recovered product from the SVE system to the Ground Water Treatment System (GWTS). Up to that point, approximately 5,205 gallons of product had been recovered from subsurface soil by the SVE system.

The groundwater treatment component of the selected remedy consisted of pumping the contaminated groundwater from the aquifer, treating it with a Powdered Activated Carbon Treatment (PACT) system and then returning the treated groundwater to the aquifer. Treatability studies conducted on the PACT system showed that this treatment system could not meet the discharge limitations; therefore, an Explanation of Significant Differences (ESD), issued on September 17, 1996, called for modifying the ROD to allow the use of an air stripper to remove contaminants from groundwater and allow surface water discharge to be implemented instead of using groundwater re-injection. In addition, the ESD called for only the most contaminated part of the plume to be treated via the extraction and treatment system, thereby allowing the remaining low level contaminant concentrations outside the capture zone to naturally attenuate. The remedial design of the groundwater pump and treatment system started on April 2, 1992 and was completed on July 8, 1997.

Construction of the groundwater pump and treatment system was completed on March 1998.

A Groundwater Monitoring Plan was finalized in 1999. The Groundwater Monitoring Plan evaluates the effectiveness and protectiveness of the groundwater treatment remedy. In summary, the Groundwater Monitoring Plan calls for the monitoring of a total of 12 wells, four of which are Compliance Wells (CWs): AOP-9, AOP-110, MW-5, and AOP-108 and three Recovery Wells (RWs): RW-1 and RW-2, and RW-3. The CWs are the wells used to determine if groundwater contaminant levels are achieving the

objective of aquifer cleanup outside the capture zone within 9 to 13 years from the start the ground water remediation.

The PRP, via a groundwater model, generated trichloroethene (TCE) concentration-curves over time for each of the four CWs. To establish the concentration curves it was assumed, with efficient capture of groundwater contamination near its source, that the cleanup goals in CWs would be achieved in 9 to 13 years. To attain this objective, the CW TCE concentrations must stay below the curves throughout the scheduled sampling, which demonstrates the PRP has established proper capture of the contaminated groundwater and groundwater concentrations in the CW wells will attain groundwater quality standards within 9 to 13 years. If the TCE concentrations in the CWs exceed, or are anticipated to exceed the curves, the PRP must modify the pumping scheme, via new extractions wells or other corrective measures. The PRP must also stay in compliance with all its air and water New Jersey discharge permit equivalents.

Results from pump tests and groundwater modeling during design indicated that the remedial action objectives would be met by installing two extraction wells: RW-1, with an expected extraction rate of approximate 40 gallons per minute (gpm); and RW-2 with an expected extraction rate of approximately 30 gpm. RW-1 has achieved its expected extraction rate, however, RW-2's maximum extraction rate has been only 10 gallons per minute and in the past 12 months has averaged slightly over 3 gpm. A third recovery well, RW-3, was installed in 2002 in an attempt to increase extraction of groundwater contaminants and therefore increase efficiency of the capture zone. RW-3 was installed approximately 50 feet down-gradient of RW-2 and produced a maximum flow rate of 17 gpm. In the last year RW-3 averaged maximum flow rate of 6.5 gpm.

Although the extraction rate of RW-3 has been low, pumping of RW-3 enlarged the capture zone, thereby relocating MW-5 inside the new capture zone and rendering it an ineffective CW. Since the installation of RW-3, TCE concentrations in CW AOP-108 decreased by an order of magnitude and remain below the action level curve established for this CW. TCE concentrations in CW AOP-110 have been below the action level curve since the start up of the pumping system. In contrast, TCE concentrations in CW AOP-9 have exceeded its action level curve and have not been significantly affected by the additional extraction well. In addition, TCE concentrations in monitoring well AOP-117, located further down-gradient from CW AOP-9, do not appear to be declining at the expected rate.

To assess why wells located down-gradient contain contaminants above expected levels, the PRP performed two rounds of groundwater grab samples on transects perpendicular to the center line of the capture zone in 2004 and 2005. The objective of the groundwater grab sampling was to determine why concentrations of TCE in down-gradient wells AOP-9 and AOP-117 have not diminished as expected. Analysis of transect sampling data determined that general groundwater flow from the center portion of the plume is impacting AOP-9 and AOP-117, however, the specific pathway could not be determined. EPA and the PRP are currently engaged in discussions on improving the efficiency of the capture of groundwater contaminants.

The objective of achieving aquifer cleanup outside the capture zone within 13 years appears unlikely to be met at the present pumping configuration and rate. Another objective of the groundwater remediation is to provide active remediation of the groundwater from the Disposal Area and immediately down-gradient. As mentioned earlier, TCE concentrations in furthest down-gradient wells have not decreased as expected, however concentrations of contaminants in wells immediately down-gradient of the Disposal Area have decreased significantly since the start up of the pumping system (see figure 2).

In total, 8,187 gallons (79,660 lbs) of product have been removed from the soil and groundwater. At least 5,205 gallons of this product have been removed from the soil by the SVE system. During the remedial design, it was estimated that the implemented remedy would take 13 years to achieve groundwater cleanup goals (*i.e.*, MCLs) in four down-gradient compliance monitoring wells. However, the goal of the groundwater component of the remedy is to achieve the cleanup goals in all monitoring wells and, therefore, treatment beyond 13 years is now anticipated. The SVE system treats only the source of the groundwater contamination in soils, and it is likely that the SVE system could be turned off within the next five years. EPA has a Unilateral Administrative Order with the PRP to operate and maintain the SVE and the groundwater pumping and treatment systems. To improve efficiencies of the two systems, the PRP diverted condensate captured by the SVE system to the groundwater treatment system beginning in September 2001. Steady O&M performance has resulted in an average throughout of 2.2 million gallons of water per month while strictly adhering to all sampling protocols and contaminant removal efficiencies, as well as the prescribed preventive maintenance requirements of

the individual unit operations. The total annual cost, which varies year to year, has been approximately \$700,000 per year.

## **V. Progress Since Last Review**

### *Status of Recommendations and Follow-up Actions from Last Review*

The 2003 five year review document recommended that cleanup goals for soil need to be reevaluated, since new toxicological data has been released since the time of the ROD. These cleanup goals have not yet been reevaluated since the last five year review because the SVE system is still being used and the system continues to remove contaminants from soil and will continue to do so for some time. The soil cleanup goals will be reevaluated prior to shutdown of the SVE system.

## **VI. Five-Year Review Process**

### *Administrative Components*

The five-year review team consisted of Rich Puvogel (EPA-RPM), Rich Krauser (EPA-Hydrogeologist), and Chloe Metz (EPA-Risk Assessor).

### *Community Involvement*

EPA published a notice in the New Jersey Herald, the area newspaper, on April 17, 2008, notifying the community of the initiation of the five-year review process. The notice indicated that upon completion of the five-year review, the document would be available to the public at the Sparta Public Library. In addition, the notice included the RPM's name, address and telephone number for questions related to the five-year review process or the AOP site in general.

### *Document Review*

The documents, data, and information which were reviewed in completing this five-year review are summarized in Table 2.

### *Data Review*

As for the SVE system, it is assumed that until the VOC off-gas concentrations reach insignificant levels the system will continue to remove contamination from the soil and, therefore, will continue to operate. The most recent contaminant



concentrations collected from the SVE system are presented in Table 3.

The PRP collects groundwater samples on a quarterly basis. Table 4 provides applicable groundwater standards, maximum concentrations of contaminants in groundwater prior to treatment, and maximum concentrations of contaminants in groundwater from recent sampling.

#### *Site Inspection*

A site inspection for this Five-Year Review was conducted on February 12, 2008. The EPA project manager, risk assessor, hydrogeologist as well as the PRP project manager and PRP consultant were present for the Five-Year Review site inspection. The PRP routinely evaluates the effectiveness of the individual treatment units by sampling the groundwater passing through the treatment units. The plant operators are present on site seven days a week to make sure the system is properly functioning and all required testing and sampling is being done on schedule. Similarly, the PRP consultant is on the site as needed to monitor and inspect the system and conduct field sampling.

#### *Interviews / Meetings*

There is daily contact between the plant operators and the PRP's contractor personnel. There is monthly contact between the EPA and the PRP's contractor. There have been numerous meetings, phone calls and correspondence with the PRP. An interview with the Sparta Township Engineer, Charles Ryan was conducted on March 3, 2008. Mr. Ryan indicated that Township of Sparta had no concerns about the remedy. Mr. Ryan mentioned that, there have been inquiries from interested parties concerning the redevelopment of the A.O. Polymer property.

#### *Institutional Controls Verification*

The remedy will provide for unlimited use and unrestricted exposure. Contaminated groundwater is confined to four properties and these property owners are aware of the groundwater contamination. The evaluation of the direct contact pathway showed that all nearby residents are receiving public water, and since there are no residential or public supply wells in the contaminated area, there is no exposure. Based on these facts the remedy is protective for this exposure pathway and there is no reasonable risk that groundwater within the

contaminant plume will be used. Under the selected remedy, institutional controls are not required for protection during the groundwater remedial action. However, as per NJDEP regulations, and independent of the selected remedy, NJDEP established a Classification Exception Area (CEA) and a Well Restriction Area (WRA), for the area of groundwater contamination. The CEA was because constituent groundwater quality standards will not be met until the groundwater remedy achieves cleanup standards. The Well Restriction Area was established to preclude withdrawal of the contaminated groundwater associated with this Site, except for the purposes of monitoring and/or additional treatment

## **VII. Technical Assessment**

*Question A: Is the remedy functioning as intended by the decision documents*

Yes. Soil contamination at the site was addressed mainly by the removal of contaminated soil. The soils in the Disposal Area are being addressed by an SVE system. Although the SVE system is operating longer than anticipated, it is functioning as intended by the decision documents and should continue to operate into the future.

As for the groundwater remedy, the groundwater monitoring reports indicate that CW AOP-9 has not met its compliance curve. The PRP installed an additional extraction well to increase the capture of the groundwater from the source area. The additional extraction well did not bring TCE concentrations in AOP-9 below its compliance curve. The PRP performed additional groundwater sampling in transects running perpendicular to the center line of the contaminant plume to determine why TCE concentrations in AOP-9 and AOP-117 have not diminished as expected. The results of this sampling indicated the general groundwater flow from the up-gradient source area is impacting AOP-9 and AOP-117, however the specific pathway was not determined. Discussions on how to increase the efficiency of the pumping system to have a better effect on the two down-gradient wells are ongoing between EPA and the PRP. Alternatives under consideration are installation of an additional extraction well and/or performance of in-situ treatment pilot study. While these performance issues will add more time before the goals of the remedy are achieved, they are not unexpected and are typical of groundwater pump and treat remedies.

The community is on public water that meets appropriate state and federal standards. No degradation of wetlands or flora in the vicinity of the site has resulted from site contamination.

*Question B: Are the exposure assumptions, toxicity data, cleanup levels, and Remedial Action Objectives (RAOs) used at the time of the remedy still valid?*

There are no changes in the physical conditions of the site or site uses that would affect the protectiveness of the selected remedy. The exposure assumptions and the toxicity values that were used to estimate the potential risks and hazards to human health followed the general risk assessment practice at the time the risk assessment was performed. Although the risk assessment process has been updated in recent years and specific parameters and toxicity values have changed, the risk assessment process that was used is still consistent with current practice and the need to implement a remedial action remains valid.

The risk assessment evaluation of the groundwater and the Disposal Area can be found in the June 23, 1991 ROD. Briefly, EPA determined that if the subsurface soil contamination were left in place, it would serve as a continuing source of groundwater contamination. Site related contaminants were detected in the drinking water aquifer at levels above the Federal and New Jersey Maximum Contaminant Levels (MCLs).

The remedial action for groundwater is expected to continue over the next five years, the period of time considered in this review. As a result, groundwater use is not expected to change during that period.

The evaluation of groundwater in this five-year review focused on two primary exposure pathways, direct ingestion (as a potable water source) and the possibility of vapor intrusion if buildings were to be constructed over the plume. The evaluation of the direct contact pathway showed that all nearby residents are receiving public water, and since there are no residential or public supply wells in the contaminated area, there is no exposure. Therefore, the remedy is protective for this exposure pathway. The remediation goals for groundwater identified in the ROD are New Jersey Safe Drinking Water Maximum Contaminant Levels. However, since the time the ROD was signed, Groundwater Quality Standards (GWQS) have been promulgated by NJDEP. Table 4 provides a comparison of the Federal and State MCLs along with the GWQS. As shown in this table, the GWQS are the most stringent of these standards for toluene, 1,1,2-trichloroethane,

and xylenes. Soil vapor intrusion was not evaluated in the original risk assessment. This pathway was recently evaluated to determine if vapor intrusion concerns are present. Concentrations in groundwater suggest that if a structure were to be located above or adjacent to the contaminated plume, there would be the potential for vapor intrusion.

In 2006, the PRP developed a Work Plan for the Assessment of Vapor Intrusion at a residence and a business adjoining the A.O. Polymer property. Execution of the work plan required access to either one of two properties adjoining the site. Access to perform testing at both properties was denied by each of the property owners. Without access to these properties, the PRP was unable to proceed with the vapor intrusion assessment. Vapor intrusion is not a concern down-gradient since this area is a recreational park.

Because the Facility Area is currently available for reuse, any development there would need to be done with consideration of the potential for vapor intrusion. Structures located above or adjacent to the contaminated plume would either have to be sampled for vapor intrusion until groundwater was remediated to levels that would not pose a vapor concern or built with remedial systems in place to prevent vapors from migrating indoors.

Since the ROD was signed, EPA has developed several new toxicity values that allow for the derivation of chemical-specific remediation goals for contaminated media, including soils. The cleanup goals for soils provided in the ROD, 1 ppm for total VOCs and 10 ppm for total semivolatile organics, should be reevaluated to determine if they are protective in light of these newly developed toxicity values, for both potential direct-contact exposure pathways, and for protection of groundwater. This reevaluation needs to be performed before the shut-down of the SVE system, to determine whether additional treatment is required to assure that the remedy is protective. The SVE system may achieve the cleanup goals for soils established in the ROD within the next five years; therefore, EPA expects that this reevaluation of the soil cleanup goals will take place in the next five years.

Post-removal action soil samples taken on the Facility Area indicated that soil on the Facility Area does not exceed New Jersey Residential Direct Contact Soil Cleanup Criteria. As of this date, the SVE system and the groundwater pump and treatment system continue to remove contaminants from the soil and

groundwater. However the groundwater pumping system will not meet the groundwater remediation program objective of achieving aquifer cleanup outside the capture zone within 13 years under the present groundwater extraction rates and level of efficiency of the groundwater capture zone. In response, EPA has engaged the PRP in discussions to take actions to modify the groundwater capture zone and/or consider in-situ treatment alternatives. EPA will continue to monitor the efficiency of the groundwater capture zone and take additional measures as necessary.

*Question C: Has any other information come to light that could call into question the protectiveness of the remedy? No.*

#### *Remedy Assessment Summary*

Based upon this five-year review, it has been found that:

- Contaminated site soils outside of the Disposal Area have been removed off site.
- Contaminated soils in the Disposal Area are being remediated by an SVE system, which is operating properly.
- There are no drinking water wells within the plume of contamination and none are expected because of existing state restrictions.
- Groundwater monitoring wells and recovery wells are functional. Operational adjustments of the pumping system have been implemented but are projected to be unable to meet their objective. Discussions are underway to consider installation of additional recovery well(s) and/or the use of in-situ treatment alternatives. The groundwater and SVE treatment systems are operating properly.

#### **VIII. Recommendations and Follow-Up Actions**

This site has ongoing soil and groundwater remediation activities consistent with the decision documents. This report did not identify any issue or make any recommendation for the protection of public health and/or the environment which was not included or anticipated by the site decision documents. As described above, the ROD cleanup goals for soil need to be reevaluated, since new toxicological data has been released since the time of the ROD. This reevaluation needs to occur before the SVE system is shut down and removed from the site.

## IX. Protectiveness Statement

The remedy at OU1 is protective of human health and the environment because the soil vapor extraction system is currently operating and effectively removing volatile organic compounds from the soil. The remedy at OU2 is protective of human health and the environment because the groundwater pump and treatment system is operating, and there are no drinking water wells within the contaminant plume and none are expected. The groundwater contaminant plume is confined to the shallow aquifer and confined within the immediate vicinity of the site. The groundwater contaminants that are removed via the extraction/treatment facility are captured by a resin bed system and are drummed for removal from the site. Currently, there is no exposure of human and/or environmental receptors to site contaminants. Because the remedial actions at all operable units are protective, the site is protective of human health and the environment.

## X. Next Review

The third five-year review for the AOP site should be completed before May, 2013

Approved:

for Susan A. Janowak  
George Pavlou, Director  
Emergency and Remedial Response Division

4/24/08  
Date

Table 1: Chronology of Events

Event	Date
Operator of the site, expands business from the manufacture of resins to include solvent reclamation.	1964
Citizens living and working near the Site register first complaints of odors emanating from the Site and well water.	1973
Complaints of odors and bad smelling well water intensify, touching off formal investigations by the Sparta Health Department and NJDEP.	1978
Owners of affected wells in the vicinity of the site file claims to the New Jersey Hazardous Spill Fund and are subsequently connected to the municipal water supply.	1979
Cleanup at the Site was initiated by NJDEP including removal of 1,150 drums and excavation and removal of 1,700 cubic yards of contaminated soil in the Disposal Area.	1980
NJDEP installed monitoring wells in and around the site.	1982
Site was placed on the National Priorities List.	1983
The Remedial Investigation and Feasibility Study was initiated by NJDEP.	1984
Record of Decision for soil and groundwater remedy was issued.	1991
Production activities at the facility cease and the Site operator abandons unsecured hazardous material on the Facility Area of the Site.	1994
Construction of the soil remediation system (soil vapor extraction) is completed and was operational and functional.	1995
ESD was issued, modifying the ROD to allow the use of an air stripper in the groundwater treatment process.	1996
Construction of the groundwater treatment system was completed.	1998
EPA removal activities at the Facility Area of the Site were completed resulting in the removal 34,000 pounds of hazardous waste.	1998
Facility Area of the Site was deleted from the NPL	2002
First Five Year Review Completed	2003

Table 2: Documents, Data, and Information Reviewed in  
Completing the Five Year Review

Remedial Investigation Report	4/1991
A.O. Polymer Record of Decision	6/1991
Pre-Design Report	12/1995
NJDEP CEA Approval Letter	4/1998
Remedial Action Report Ground Water Treatment System	9/1998
Groundwater Monitoring Plan	1/1999
A.O. Polymer Five Year Review Report	9/2003
Grab Groundwater Sampling Letter Report	1/2005
Additional Grab Groundwater Sampling Letter Report	2/2006
Groundwater Monitoring Progress Report	2007
Monthly Progress Report	2/2008



**A. O. Polymer Site**  
**SVE System / Monthly Monitoring Report**

	Apr-07	May-07	Jun-07	Jul-07	Aug-07	Sep-07	Oct-07	Nov-07	Dec-07	Jan-08	Feb-08	Mar-08
SV-1	0	0	0	1	0	1	0	1	2	1	1	1
SV-2	0	1	2	2	1	2	0	2	3	2	2	2
SV-3	16	15	4	3	3	3	5	3	6	3	2	2
SV-4	0	0	3	2	2	2	1	2	3	3	2	2
SV-5	17	20	3	3	3	3	3	6	6	4	2	2
SV-6	0	0	2	2	1	2	42	3	4	2	1	1
SV-7	7	7	14	16	110	137	229	151	30	4	2	2
SV-8	16	14	11	30	58	112	166	239	116	6	3	4
SV-9	0	0	2	2	8	9	15	3	4	2	1	2
SV-10	27	32	48	56	100	138	200	82	50	17	9	8
SV-11	7	8	3	3	1	2	0	1	3	2	1	2
SV-12	1	1	1	2	1	2	1	2	3	2	2	2
Before Purus	18	25	25	35	100	136	195	162	53	22	7	8
After Purus	2	2	4	6	14	3	8	18	5	4	2	3

Air velocity (fpm)	2,000	2,000	2,000	1,800	1,800	1,800	1,800	2,000	2,000	2,000	2,000	2,000
--------------------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------

Recovered
Offsite Disposal

All concentrations are ppm as methane (except where noted).

Table 4: Comparison of Groundwater Standards for Chemicals of Concern: Pre Treatment and Post Treatment Concentrations

Parameter	Federal MCL (ug/l)	NJ MCL (ug/l)	NJ GWQS (ug/l)	Maximum Conc. Before Pump and Treatment Well 3s (1994) (ug/l)	Maximum Concentration 5/16/07 Sampling of Well 3s (ug/l)
Trichloroethene	5	1	1	46,000	1.9
1,1-Dichloroethene	7	2	2	170	ND
cis-1,2-Dichloroethene	70*	10	10	25,000	2.5
trans-1,2-Dichloroethene	100*	10	100	13	ND
Ethylbenzene	700*	--	700	640	ND
Toluene	2000*	--	1000	9,700	ND
1,1,1-Trichloroethane	200	26	30	41,000	1.8
1,1,2-Trichloroethane	5*	--	3	65	ND
Xylenes	10000*	--	--	2,800	ND

\* Identified in the ROD as "Proposed MCL"

Table 5: Acronyms Used in this Document

1,1-DCE	1,1-dichloroethene
1,2-DCE	1,2-dicholoroethane
AOP	Always Outstanding Polymer
CEA	Classification Exception Area
CW	Compliance Well
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Differences
GWTS	Ground Water Treatment System
GWQS	Ground Water Quality Standards
MCL	Maximum Contaminant Level
NJDEP	New Jersey Department of Environmental Protection
NPL	National Priorities List
NYS&W	New York Susquehanna & Western
PACT	Powdered Activated Carbon Treatment
PRP	Potentially Responsible Party
RAO	Remedial Action Objectives
RD/RA	Remedial Design/Remedial Action
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RW	Recovery Well
SVE	Soil Vapor Extraction
TCE	Trichloroethane
TPH	Total Petroleum Hydrocarbons
VOC	Volatile Organic Compound
WRA	Well Restriction Area

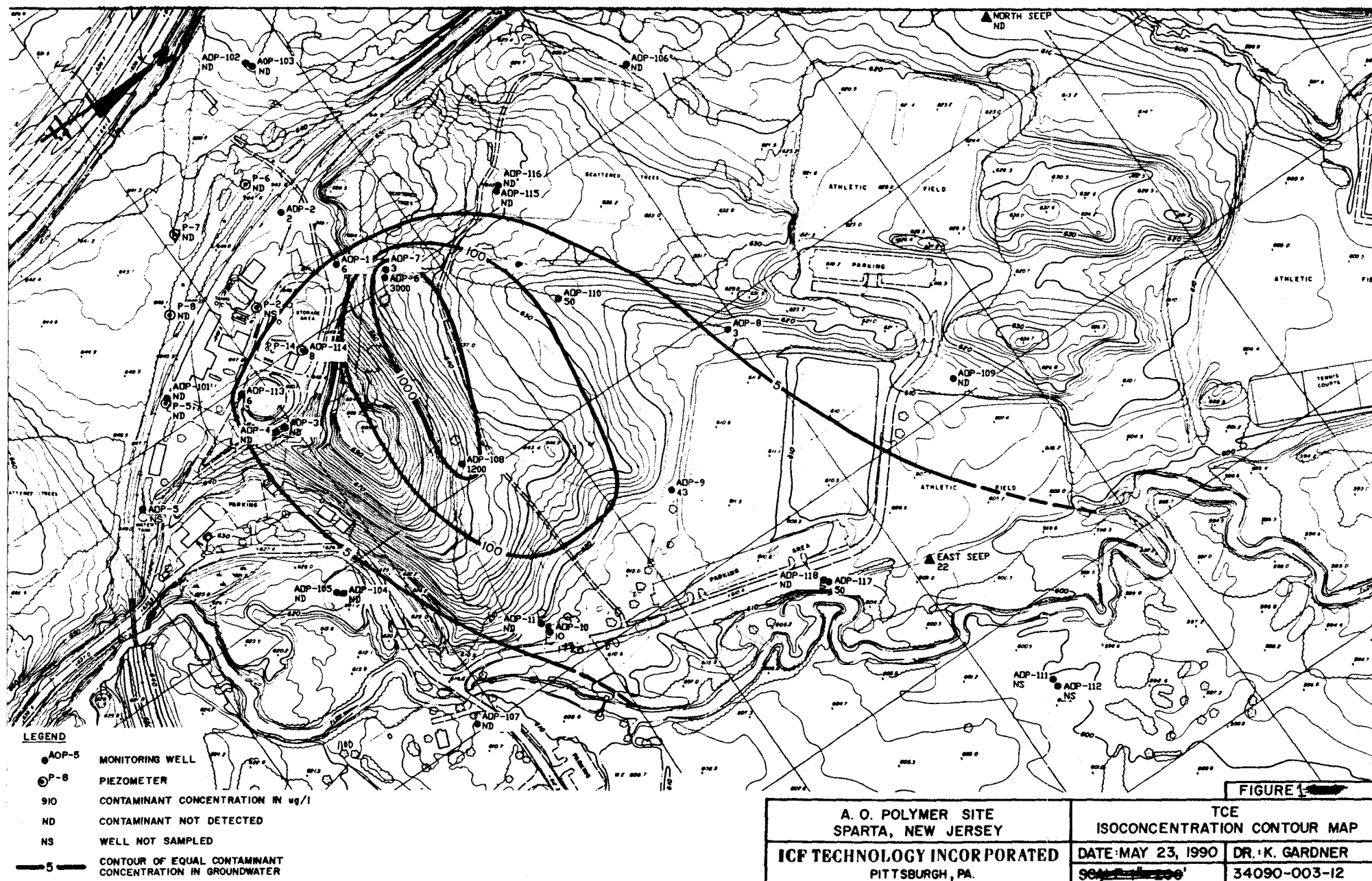


FIGURE 1

